# Table of Contents

**Wednesday, November 28, 2012**

Session Code: A1P-B  
Medical Information Systems, Training and Education  
Moderator: Andrew Mason

<table>
<thead>
<tr>
<th>A1P-B-1</th>
<th>Prediction of Mortality</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gymama Slaughter, Zach Kurtz, Marie Desjardins, Peter F. Hu, Colin Mackenzie, Lynn Stansbury, Deborah M. Stein</td>
<td></td>
</tr>
<tr>
<td></td>
<td>University of Maryland Baltimore County, USA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A1P-B-2</th>
<th>A Flexible Attitude System for Wireless Micro-Ball Endoscopy</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Zheng Yin, Guolin Li, Xiang Xie, Yingke Gu, Jun Hu, Dan Wang, Zhihua Wang</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tsinghua University, China</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A1P-B-3</th>
<th>Neurofeedback Training on Memory Enhancement in Humans</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Jen-Jui Hsueh, Tzu-San Chen, Fu-Zen Shaw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Cheng Kung University, Taiwan</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A1P-B-4</th>
<th>Implantable Biomedical Microsystems: a New Graduate Course in Biomedical Circuits and Systems</th>
<th>13</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amir M. Sodagar</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K. N. Toosi University of Technology, Iran / Ecole Polytechnique de Montreal, Canada</td>
<td></td>
</tr>
</tbody>
</table>
Session Code: A1P-C
Bioinspired Systems I / Innovative Circuits for Medical Applications I
Moderator: Maysam Ghovanloo

A1P-C-1  An Implementation of Magnocellular Pathways in Event-Based Retinomorphic Systems
Matthew Lubelski Katz, Carolina Lutterbeck, Konstantin Nikolic
Imperial College London, United Kingdom

A1P-C-2  65k-Neuron Integrate-and-Fire Array Transceiver with Address-Event Reconfigurable Synaptic Routing
Theodore Yu, Jongkil Park, Siddharth Joshi, Christoph Maier, Gert Cauwenberghs
University of California, San Diego, USA

A1P-C-3  Implementation of a Neuron Emulator for Patch-Clamp Settings
Robert Rieger\textsuperscript{1}, Yen Cheng Wu\textsuperscript{1}, Ying Sun\textsuperscript{2}
\textsuperscript{1}National Sun Yat-Sen University, Taiwan; \textsuperscript{2}University of Rhode Island, USA

A1P-C-4  Design of Negative High Voltage Generator for Biphasic Stimulator with SoC Integration Consideration
Ya-Chun Huang, Ming-Dou Ker, Chun-Yu Lin
National Chiao Tung University, Taiwan

A1P-C-5  A 90 nm CMOS Low Noise Readout Front-End for Portable Biopotential Signal Acquisition
Wei-Chih Huang, Kea-Tiong Tang
National Tsing Hua University, Taiwan
Session Code: A2P-B
Biosensor Devices and Interfaces I
Moderator: Pantelis Georgiou

A2P-B-1  3D Finite Element Analysis of the Electric Field Generated by Epi-Retinal MEMS Electrodes ............................................................... 37
Xiaohong Sui, Yu Huang, Xinyu Chai, Guoxing Wang
Shanghai Jiao Tong University, China

A2P-B-2  Applying EMG Spike and Peak Counting for a Real-Time Muscle Fatigue Monitoring System ................................................................. 41
Ortal Dayan, Irina Spulber, Amir Eftekhar, Jeroen Bergmann, Alison McGregor, Pantelis Georgiou
Imperial College London, United Kingdom

A2P-B-3  Fast Selection of Time-Interleaved Samples for Wireless Healthcare Monitoring with Pulse Radar .......................................................... 45
Cheng-Hao Hong, Hsiao-Husan Shen, Huan-Chung Wu, Husan Shen, Chiao-Wen Cheng, Ta-Shun Chu, Jen-Ming Wu
National Tsing Hua University, Taiwan

A2P-B-4  AC Electrokinetics Assisted Impedance Biosensors for Rapid Bacteria Detection ............. 49
Yi-Tse Ho, Chun-Liang Pan, Jeng-Tzong Sheu, Yu-Kuo Wang, Tung-Kung Wu
National Chiao Tung University, Taiwan

A2P-B-5  A Smart Cushion for Real-Time Heart Rate Monitoring ...................................................... 53
Chacko John Deepu¹, Zhihao Chen², Ju-Teng Teo², Soon-Huat Ng², Xiefeng Yang², Yong Lian¹
¹National University of Singapore, Singapore; ²Agency for Science, Technology and Research, Singapore
A2P-C-1  The Effect of Force and Electrode Material on Electrode-to-Skin Impedance ....................... 57
  Vojkan Mihajlovic¹, Bernard Grundlehner²
  ¹Philips Research, The Netherlands; ²Holst Centre / IMEC-NL, The Netherlands

A2P-C-3  A Capacitively-Coupled Biomedical Instrumentation Amplifier Employing Chopping
  and Auto-Zeroing .......................................................................................................................... 61
  Peng Sun, Menglian Zhao, Xiaobo Wu, Qing Liu
  Zhejiang University, China

A2P-C-4  An ISFET Design Methodology Incorporating CMOS Passivation ................................. 65
  Mohammadreza Sohbati, Yan Liu, Pantelis Georgiou, Christofer Toumazou
  Imperial College London, United Kingdom

A2P-C-5  CMOS Surface Acoustic Wave Oscillator with Low Noise Synchronous Type Readout
  Circuits ........................................................................................................................................... 69
  Szu-Chieh Liu, Kea-Tiong Tang
  National Tsing Hua University, Taiwan

A2P-C-6  An Ultra-Low Noise Current Source for Magnetoresistive Biosensors Biasing .......... 73
  Tiago Costa, Moises S. Piedade, Marcelino Santos
  Instituto Superior Tecnico, Portugal
Session Code: A3P-B
Live Demonstrations
Moderator: Herming Chiueh

A3P-B-1  iMus - Intelligent Medication Use Solution .......................................................... 77
Hsuan-Chih Lin, Pei-Hsuan Tsai, Yi-Zong Ou
National Cheng Kung University, Taiwan

A3P-B-2  Implantable Stimulator for Epileptic Seizure Suppression with Loading Impedance
Adaptability ........................................................................................................ 78
Chun-Yu Lin, Ming-Dou Ker, Wei-Ling Chen
National Chiao Tung University, Taiwan

A3P-B-3  Real-time Wavelet Spike Detection with In-Vitro Biological Signals ...................... 79
Yannick Bornat, Adam Quotb, Jean-Baptiste Floderer, Theotime Bollengier,
Sylvie Renaud
Universite de Bordeaux, France

A3P-B-4  A Wireless ECG Acquisition SoC ............................................................................. 80
Liang-Hung Wang¹, Tsung-Yen Chen¹, Shuenn-Yuh Lee¹, Jia-Hua Hong³, Tai-Hsuan Yang², Shi-Yan
Huang², Jen-Hao Wu², Kuang-Hao Lin², Qiang Fang³
¹ National Chung Cheng University, Taiwan; ² National Chin Yi University of Technology,
Taiwan; ³ RMIT University, Australia

A3P-B-6  Intraoral Tongue Drive System Demonstration......................................................... 81
Hangue Park, Jeonghee Kim, Maysam Ghovanloo
Georgia Institute of Technology, USA

A3P-B-7  Compact Electro-Acupuncture System for Multi-Modal Feedback Stimulation .......... 82
Kiseok Song, Hyungwoo Lee, Sunjoo Hong, Hyunwoo Cho, Kwonjoon Lee, Hoi-Jun Yoo
Korea Advanced Institute of Science and Technology, Korea

A3P-B-8  The Implementation of CMOS Biopotential Signal Recording Systems .................. 83
Wei-Ming Chen, Chung-Yu Wu
National Chiao Tung University, Taiwan

A3P-B-9  Wearable Mental Health Monitoring System with Planar-Fashionable Circuit Board ...... 84
Taehwan Roh, Kyungryl Bong, Sunjoo Hong, Hyunwoo Cho, Hoi-Jun Yoo
Korea Advanced Institute of Science and Technology, Korea

A3P-B-10 Demonstration of Implantable Grid Electrode/3-Dimensional Probe Array for ECOG
and Extracellular Neural Recording on Rat................................................................. 85
Chih-Wei Chang, Lei-Chun Chou, Jin-Chern Chiou
National Chiao Tung University, Taiwan
Session Code: A1P-C
Bioinspired Systems I / Innovative Circuits for Medical Applications I
Moderator: Maysam Ghovanloo

A3P-C-1  An FPGA-Based Continuous Wave Diffuse Optical Tomography System ............................ 86
Shih Kang¹, Shih-Yang Wu¹, Ching-Ju Cheng¹, Wai-Chi Fang¹, Wen-Chung Kao²
¹National Chiao Tung University, Taiwan; ²National Taiwan Normal University, Taiwan

A3P-C-2  A Mobile ECG Healthcare Platform ............................................................................................. 87
Hsi-Pin Ma¹, Chun-Chieh Chan¹, Ching-Wei Chen¹, Wei-Chieh Chou¹, Yi-Lwun Ho²,
Yen-Hung Lin²
¹National Tsing Hua University, Taiwan; ²National Taiwan University Hospital and National Taiwan University, Taiwan

A3P-C-3  A Portable Closed-loop Seizure Controller in Freely Moving Rats ......................................... 88
Sheng-Fu Liang¹, Fu-Zen Shaw¹, Da-Wei Chang¹, Chung-Ping Young¹, Yu Lin Wang², Sih Yen Wu³
¹National Cheng Kung University, Taiwan; ²National Chiao Tung University, Taiwan

A3P-C-4  IR-UWB Transceiver with Localization Based on ToF Technique Suitable for Wireless
Capsule Endoscopy ................................................................................................................................... 89
Shanthi Sudalaiyandi, Hakon A. Hjortland, Tuan-Anh Vu, Oivind Nass, Tor Sverre Lande
University of Oslo, Norway

A3P-C-5  Learning to Recognize Visual Stimuli in Neuromorphic VLSI ................................................. 90
Massimiliano Giulioni¹, Federico Corradi²
¹Istituto Superiore di Sanita, Italy; ²University of Zurich and ETH, Switzerland

A3P-C-6  Spiking ratSLAM: Rat Hippocampus Cells in Spiking Neural Hardware .............................. 91
Francesco Galluppi¹, J. Conradt², T. Stewart³, Chris Eliasmith³, T. Horiuchi⁴,
Jonathan Tapson⁵, Bryan Tripp³, Ralph Etienne-Cummings⁶, S. Furber¹
¹University of Manchester, United Kingdom; ²Technische Universitat Munchen, Germany; ³University of Waterloo, Canada; ⁴University of Maryland, USA; ⁵University of Western Sydney, Australia; ⁶Johns Hopkins University, USA

A3P-C-7  A Tactile Perception System for Sensing the Visual World .................................................... 92
Colleen Rhoades¹, Timothy Advani², Kevin Mazurek², Ralph Etienne-Cummings²
¹Washington University in St. Louis, USA; ²Johns Hopkins University, USA

A3P-C-8  A Multi-Channel ECoG Acquisition SoC for Real-Time Seizure Detection ............................ 93
Tsan-Jieh Chen, Sheng-Cheng Lee, Herming Chiueh
National Chiao Tung University, Taiwan

A3P-C-9  Wireless Sensors and Systems for Body Area Network (BAN) .............................................. 94
Rick Lin, Peter Lemmens, Lewis Peng, Mavis Chang, Alison Lin, Jin-Lien Lin
imec Taiwan Innovation Center, Taiwan
A3P-C-10 A Smart Portable Electronic Nose System for Fruity Odors Identification ........................................95

Hung-Yi Hsieh, Shih-Wen Chiu, Kea-Tiong Tang

National Tsing Hua University, Taiwan
Thursday, November 29, 2012

Session Code: B1P-B
Body Area Network / Body Sensor Network I
Moderator: Yong Lian

B1P-B-1  A 80-uW 2-Mb/S Transceiver for Human Body Channel Binaural Communication .............. 96
Jhih-Cing Sun, Jou-Ling Chen, Yi-Hung Shen, Shiu-Chain You, Shyh-Jye Jou,
Tzu-Hsien Sang
National Chiao Tung University, Taiwan

B1P-B-2  A Low-Power Body-Channel Communication System for Binaural Hearing Aids.............. 100
Jou-Ling Chen, Jhih-Cing Sun, Yi-Hung Shen, Tzu-Hsien Sang, Tian-Sheuan Chang,
Shyh-Jye Jou
National Chiao Tung University, Taiwan

B1P-B-3  Motion Recognition for Unsupervised Hand Rehabilitation Using Support Vector
Machine ........................................................................................................................................ 104
Liquan Guo¹, Xudong Gu², Jianming Fu², Jiping Wang¹, Qiang Fang¹
¹Suzhou Institute of Biomedical Engineering and Technology, CAS, China;²The Second Hospital of
Jiaxing, China

B1P-B-4  Wireless EEG System with Real Time Impedance Monitoring and Active Electrodes ....... 108
Shrishail Patki¹, Bernard Grundlehner¹, Auryn Verwegen¹, Srinjoy Mitra², Jiawei Xu¹,
Akinori Matsumoto³, Julien Penders¹, Refet Firat Yazicioglu²
¹Holst Centre / IMEC-NL, The Netherlands;²IMEC, Belgium;
³Panasonic Corporation, Japan

B1P-B-5  A Wearable Wireless ECG Sensor with Real-Time QRS Detection for Continuous
Cardiac Monitoring...................................................................................................................... 112
David Liang Tai Wong, Yong Lian
National University of Singapore, Singapore

B1P-B-6  A Quasi-Digital Radio System for Muscle Force Transmission Based on Event-
Driven IR-UWB ............................................................................................................................. 116
Alessandro Sanginario¹, Marco Crepaldi¹, Marco Paleari¹, Alberto Bonanno¹,
Paolo Ariano¹, Danilo Demarchi¹, Duc Hoa Tran²
¹Istituto Italiano di Tecnologia, Italy;²Politecnico di Torino, Italy
Session Code: B1P-C
Biosensor Devices and Interfaces III
Moderator: Joseph S. Chang

B1P-C-1  A Low Power Analog Front-End (AFE) Circuit Dedicated for Driving Bio-Electrochemical Sensors and Peripheral Devices ................................................................. 120
Wei-Jhe Ma, Ching-Hsing Luo, Hong-Yi Huang
1National Cheng Kung University, Taiwan; 2National Taipei University, Taiwan

B1P-C-2  Design, Fabrication, and Test of a Sensor Array for Perspective Biosensing in Chronic Pathologies ............................................................................................................. 124
Andrea Cavallini, Camilla Baj-Rossi, Sara Ghoreishizadeh, Giovanni De Micheli, Sandro Carrara
Ecole Polytechnique Federale de Lausanne, Switzerland

B1P-C-3  A Current-Mode Potentiostat for Multi-Target Detection Tested with Different Lactate Biosensors ........................................................................................................................................... 128
S. Sara Ghoreishizadeh, Irene Taurino, Sandro Carrara, Giovanni De Micheli
Ecole Polytechnique Federale de Lausanne, Switzerland

B1P-C-4  An 8-Channel Fully Differential Analog Front-End for Neural Recording ............................................. 132
Yun Gui, Xu Zhang, Yuan Wang, Sanyuan Chen, Beiju Huang, Weihua Pei, Hongda Chen, Kai Liang, Sulibao Huang, Bo Wang, Zhaohui Wu, Bin Li
1Institute of Semiconductors, CAS, China; 2South China University of Technology, China

B1P-C-5  Compact Potentiostat for Cellular Electrochemical Imaging with 54 Parallel Channels ................................................................................................................................. 136
Marco Vergani, Marco Carminati, Giorgio Ferrari, Letizia Amato, Arto Heiskanen, Maria Dimaki, Winnie Edith Svendsen, Jenny Emneus, Marco Sampietro
1Politecnico di Milano, Italy; 2Danmarks Tekniske Universitet, Denmark

B1P-C-6  Fabrication of a Miniaturized Room Temperature Ionic Liquid Gas Sensor for Human Health and Safety Monitoring .................................................................................. 140
Xiaoyi Mu, Zhe Wang, Min Guo, Xiangqun Zeng, Andrew J. Mason
1Michigan State University, USA; 2Oakland University, USA
Session Code: B2L-A
Biomedical Electronics and Systems for Body Sensor Networks
Moderator: Shuenn-Yuh Lee

B2L-A-1 Image Signal Transmission Through Brain by an Implantable Micro-Imager ..................... 144
Kiyotaka Sasagawa1, Shogo Yokota1, Chikara Kitsumoto1, Takashi Matsuda2, Peter Davis3, Bing Zhang2, Keren Li2, Toshihiko Noda1, Takashi Tokuda1, Jun Ohta1
1Nara Institute of Science and Technology, Japan; 2National Institute of Information and Communications Technology, Japan; 3Telecognix, Japan

B2L-A-2 A Wireless Pulse Oximetry System with Active Noise Cancellation of Motion Artifacts ... 148
Chun-Yen Wang, Yi-Hsiang Yang, Shi-Xian Wang, Kea-Tiong Tang, Jen-Ming Wu
National Tsing Hua University, Taiwan

B2L-A-3 An Integrated Low-Power Asynchronous Epileptic Seizure Detector.............................................. 152
Marjan Mirzaei1, Muhammad Tariqus Salam1, Dang Khoa Nguyen2, Mohamad Sawan1
1Polytechnique Montreal, Canada; 2Centre Hospitalier de Universite de Montreal, Canada

B2L-A-4 A Wireless ECG Acquisition SoC for Body Sensor Network.......................................................... 156
Liang-Hung Wang1, Tsung-Yen Chen1, Shuenn-Yuh Lee1, Tai-Hsuan Yang2, Shi-Yan Huang2, Jen-Hao Wu2, Kuang-Hao Lin2, Qiang Fang3
1National Chung Cheng University, Taiwan; 2National Chin Yi University of Technology, Taiwan; 3RMIT University, Australia

B2L-A-5 Motion Artifact Removal Using Cascade Adaptive Filtering for Ambulatory ECG
Monitoring System ............................................................................................................................................. 160
Hyejung Kim1, Sunyoung Kim1, Nick Van Helleputte1, Torfinn Berset2, Di Geng2, Inaki Romero2, Julien Penders2, Chris Van Hoof1, Refet Firat Yazicioglu1
1IMEC, Belgium; 2Holst Centre / IMEC-NL, The Netherlands
B3L-A-1  Opto-μECoG Array: Transparent μECoG Electrode Array and Integrated LEDs for Optogenetics

Ki Yong Kwon, Brenton Sirowatka, Arthur Weber, Wen Li
Michigan State University, USA

B3L-A-2  Rapid Detection of E.Coli Bacteria Using Potassium-Sensitive FETs in CMOS

Nasim Nikkhoo, P. Glenn Gulak, Karen Maxwell
University of Toronto, Canada

B3L-A-3  ISFET’s Threshold Voltage Control Using Bidirectional Electron Tunnelling

Abdulrahman Al-Ahdal¹, Pantelis Georgiou², Christofer Toumazou²
¹Umm Al-Qura University, Saudi Arabia; ²Imperial College London, United Kingdom

B3L-A-4  A TDC Based ISFET Readout for Large-Scale Chemical Sensing Systems

Kaiming Wang, Yan Liu, Chris Toumazou, Pantelis Georgiou
Imperial College London, United Kingdom

B3L-A-5  A CMOS Optical Sensor Array for Tissue Absorption and Scattering Parameter Extraction Using Multi-Distance Near Infrared Spectroscopy

Chirag C. Sthalekar, Valencia M. J. Koomson
Tufts University, USA
Session Code: B4L-A
Electronics for Brain Science and Brain Machine Interfaces I
Moderator: Maysam Ghovanloo & Timothy Constandinou

B4L-A-1 1024-Channel-Scalable Wireless Neuromonitoring and Neurostimulation Rodent Headset with Nanotextured Flexible Microelectrodes ................................................................. 184
Arezu Bagheri1, Salam Ramy I. Gabran2, Muhammad Tariqus Salam1, Jose Luis Perez Velazquez1, Raafat R. Mansour2, Magdy M. A. Salama2, Roman Genov1
1University of Toronto, Canada; 2University of Waterloo, Canada

B4L-A-2 Portable Phosphen Image Generator Simulating Cortical Visual Prosthesis....................... 188
Hirotsugu Okuno, Tamas Fehervari, Masaru Matsuoka, Seiji Kameda, Tetsuya Yagi
Osaka University, Japan

B4L-A-3 An Effective Chip Implementation of a Real-Time Eight-Channel EEG Signal Processor Based on On-Line Recursive ICA Algorithm.............................................. 192
Wei-Yeh Shih1, Kuan-Ju Huang1, Chiu-Kuo Chen1, Wai-Chi Fang1, Gert Cauwenberghs2, Tzyy-Ping Jung2
1National Chiao Tung University, Taiwan; 2University of California, San Diego, USA

B4L-A-4 Integrated Optrode Array for Neural Stimulating and Recording ..................................... 196
Sanyuan Chen, Weihua Pei, Qiang Gui, Hui Zhao, Yuanfang Chen, Hongda Chen
Institute of Semiconductors, CAS, China

B4L-A-5 Cell-Phone Based Drowsiness Monitoring and Management System ............................. 200
Yu-Te Wang1, Kuan-Chih Huang2, Yijun Wang1, Chin-Teng Lin2, Chung-Kuan Cheng1, Tzyy-Ping Jung1
1University of California San Diego, USA; 1National Chiao Tung University, Taiwan
Session Code: B5P-B
Implantable Electronics I
Moderator: Wouter Serdijn

B5P-B-1  Low-Power, Small-Size, Generic Controller Dedicated to Implantable Biomedical Microsystems .............................................................................................................................. 204
Milad Faizollahi, Sedigheh Razmpour, Amir Masoud Sodagar, Morteza Nourian, Mohammad Yousef Darmani
1K. N. Toosi University of Technology, Iran; 2Ecole Polytechnique de Montreal, Canada

B5P-B-2  Design of Micro-Ball Endoscopy System ................................................................................ 208
Yingke Gu, Xiang Xie, Guolin Li, Tianjia Sun, Dan Wang, Zheng Yin, Yangdong Deng, Zhihua Wang
Tsinghua University, China

B5P-B-3  A 37 X 37 Pixels Artificial Retina Chip with Edge Enhancement Function for 3-D Stacked Fully Implantable Retinal Prosthesis ........................................................................................ 212
Hideki Naganuma, Kouji Kiyoyama, Tetsu Tanaka
1Tohoku University, Japan; 2Nagasaki Institute of Applied Science, Japan

B5P-B-4  A Low-Cost Reliable Online Noise Level Estimation for Accurate Spike Detection in Extracellular Recordings ............................................................................................................ 216
Nabi Sertac Artan, Xiaoxiang Xu, H. Jonathan Chao
Polytechnic Institute of New York University, USA

B5P-B-5  Auxiliary-Carrier Load-Shift Keying for Reverse Data Telemetry from Biomedical Implants ........................................................................................................................................ 220
Mousa Karimi, Amir Masoud Sodagar, Mehdi Ehsanian Mofrad, Parviz Amin
1K. N. Toosi University of Technology, Iran; 2Ecole Polytechnique de Montreal, Canada; 3Shahid Rajaee University, Iran
Session Code: B5P-C

*Electronics for Brain Science and Brain Machine Interfaces II*

Moderator: Kea-Tiong Samuel Tang

**B5P-C-1** A Signal Folding Neural Amplifier Exploiting Neural Signal Statistics .......................... 224

Yi Chenc¹, Arindam Basu¹, Minkyu Je²

¹Nanyang Technological University, Singapore; ²Agency for Science, Technology and Research, IME, Singapore

**B5P-C-2** A 64-Channel Inductively-Powered Neural Recording Sensor Array ................................. 228

Alberto Rodriguez Perez, Jens Masuch, Jose A. Rodriguez-Rodriguez, Manuel Delgado-Restituto, Angel Rodriguez Vazquez

Institute of Microelectronics of Sevilla and University of Sevilla, Spain

**B5P-C-3** Integration of a State of the Art ECoG Recording ASIC Into a Fully Implantable Electronic Environment .............................................................................................................. 232

Michael Foerster, Jean Porcherot, Stephane Bonnet, Aurelien Van Langenhove, Stephanie Robinet, Guillaume Charvet

CEA LETI, France

**B5P-C-4** A 1.3μW 0.0075mm² Neural Amplifier and Capacitor-Integrated Electrodes for High Density Neural Implant Recording .............................................................. 236

Mohamed Elzeftawi, Samuel Beach, Le Wang, Luke Theogarajan

University of California, Santa Barbara, USA

**B5P-C-5** Real Time Control of a Wireless Powering and Tracking System for Long-Term and Large-Area Electrophysiology Experiments ......................................................... 240

Peter McMenamin, Uei-Ming Jow, Mehdi Kiani, Maysam Ghovanloo

Georgia Institute of Technology, USA
Session Code: B6L-A
Implantable Electronics II
Moderator: Yong Lian & Timothy Constantinou

B6L-A-1 A Micro Imaging Device for Measuring Neural Activities in the Mouse Deep Brain with Minimal Invasiveness ................................................................. 244
Jun Ohta¹, Chikara Kitsumoto¹, Toshihiko Noda¹, Kiyotaka Sasagawa¹, Takashi Tokuda¹, Mayumi Motoyama¹, Yasumi Ohta¹, Takuma Kobayashi², Yasuaki Ishikawa¹,
Sadao Shiosaka¹
¹Nara Institute of Science and Technology, Japan; ²Kinki University, Japan

B6L-A-2 A 155μW 88-dB DR Discrete-Time Delta Sigma Modulator for Digital Hearing Aid Applications ................................................................................................................................. 248
Serena Porrazzo¹, Alonso Morgado², David San Segundo Bello², Francesco Cannillo²,
Chris Van Hoof², Arthur H.M. van Roermund¹, Eugenio Cantatore¹
¹Eindhoven University of Technology, The Netherlands; ²IMEC, Belgium

B6L-A-3 Inverter Based Readout Circuit for Implanted Glucose Sensor ...................................................... 252
Thanh Trung Nguyen, Philipp Hafliger
University of Oslo, Norway

B6L-A-4 Pulse Delay Modulation (PDM) a New Wideband Data Transmission Method to Implantable Medical Devices in Presence of a Power ............................................................ 256
Mehdi Kiani, Maysam Ghovanloo
Georgia Institute of Technology, USA

Enver G. Kilinc¹, Franco Maloberti², Catherine Dehollain¹
¹Ecole Polytechnique Federale de Lausanne, Switzerland; ²Universita degli Studi di Pavia, Italy
Friday, November 30, 2012

Session Code: C1P-B
Biomedical Imaging Technologies and Image Processing I
Moderator: Julio Georgiou

C1P-B-2  Optimal Doppler Frequency Estimators for Ultrasound and Optical Coherence Tomography ................................................................. 264
Aaron C. Chan\textsuperscript{1}, Edmund Y. Lam\textsuperscript{1}, Vivek J. Srinivasan\textsuperscript{2}
\textsuperscript{1}The University of Hong Kong, Hong Kong; \textsuperscript{2}Massachusetts General Hospital,
Harvard Medical School, USA

C1P-B-3  Quantification of Sub-Resolution Sized Targets in Cell Fluorescent Imaging ............... 268
Julien Ghaye, Giovanni De Micheli, Sandro Carrara
Ecole Polytechnique Federale de Lausanne, Switzerland

C1P-B-4  Estimation of Muscle Fiber Orientation in Ultrasound Images After Adaptive Non-Local Filtering (ANF) ............................................................... 272
Qing Wang\textsuperscript{1}, Bin Chen\textsuperscript{2}, Junshi Liu\textsuperscript{3}, Yongjin Zhou\textsuperscript{3}, Lan Liu\textsuperscript{1}, Lei Wang\textsuperscript{3}
\textsuperscript{1}Wuhan University of Technology, China; \textsuperscript{2}Harbin Institute of Technology Shenzhen Graduate School, China; \textsuperscript{3}Shenzhen Institutes of Advanced Technology, CAS, China
Session Code: C1P-C
Biomedical Imaging Technologies and Image Processing II
Moderator: Philipp Hafliger

C1P-C-1  A Method for the Generation of Small Intestine Map Based on Endoscopic Micro-Ball

Pengfei Zhang, Dan Wang, Xiang Xie, Guolin Li, Yingke Gu, Tianjia Sun, Zhihua Wang
Tsinghua University, China

C1P-C-2  An Effective Forward Model Based on Accelerated Monte Carlo Method for Diffusion Optical Tomography Imaging Systems

Shih-Yang Wu, Wai-Chi Fang
National Chiao Tung University, Taiwan

C1P-C-3  Detection of Human Fall in Video Using Shadow Information

Yie-Tarng Chen, You-Rong Lin, Wen-Hsien Fang
National Taiwan University of Science and Technology, Taiwan

C1P-C-4  A Cloud Computing-Based Image Codec System for Lossless Compression of Images on a Cortex-A8 Platform

Lih-Jen Kau, Cheng-Chang Chung, Ming-Sian Chen
National Taipei University of Technology, Taiwan
Session Code: C2L-A

Advances and Emerging Technologies in Biosensors and Bio-Signal/Image Processing Systems

Moderator: Gwo-Giun Chris Lee

C2L-A-1 Texture Analysis for Dermoscopic Image Processing ........................................................... 292

Leszek A. Nowak, Maciej J. Ogorzalek, Marcin P. ?Pawlowski
Jagiellonian University, Poland

C2L-A-2 Wireless Implantable Biomicrosystem for Bladder Pressure Monitoring and Nerve Stimulation ................................................................................................................................... 296

Yu-Ting Li, Jia-Jin Jason Chen, Lung-Tai Chen, Wen-Shan Lin, Chun-Hsun Chu
1 National Cheng Kung University, Taiwan; 2Industrial Technology Research Institute, Taiwan

C2L-A-3 Impact of Stroke Volume Determination on Pressure-Volume Relations Measured by Conductance Catheter ................................................................................................................ 300

Chia-Ling Wei, Chung-Dann Kan, Jieh-Neng Wang, Yi-Wen Wang, Mei-Ling Tsai
National Cheng Kung University, Taiwan

C2L-A-4 Gabor Feature Extraction for Electrocardiogram Signals ...................................................... 304

Gwo Giun Lee, Jhen-Yue Hu, Chun-Fu Chen, Huan-Hsiang Lin
National Cheng Kung University, Taiwan
Session Code: C3L-A
Biosignal Processing I
Moderator: Mohamad Sawan & Julio Georgiou

C3L-A-1  Wireless 3-Lead ECG System with On-Board Digital Signal Processing for Ambulatory Monitoring ................................................................. 308

    Dilpreet Buxi¹, Torfinn Berset¹, Martijn Hijdra¹, Marc Tutelaers¹, Di Geng¹, Jos Hulzink¹,
    Michel van Noorloos¹, Tom Torfs², Nick van Helleputte², Inaki Romero¹

¹Holst Centre / IMEC-NL, The Netherlands; ²IMEC, Belgium

C3L-A-2  Individual Classification Through Autoregressive Modelling of Micro-Doppler Signatures ................................................................. 312

    Guillaume Garreau, Nicoletta Nicolaou, Julius Georgiou

University of Cyprus, Cyprus

C3L-A-3  Wheeze Detection Using Fractional Hilbert Transform in the Time Domain ......................... 316

    Zhenzhen Li, Xiaoming Wu

South China University of Technology, China

C3L-A-4  An Efficient and Accurate Empirical Mode Decomposition of the Technical Design and Methods for Biological Sound ..................................................... 320

    Wai-Chi Fang¹, Chia-Ching Chou¹, Tzu-Hsun Hung¹, Kuen-Chih Lin¹, Yu-Ching Chang², Huang-Te Li²,
    Bai-Kuang Hwang², Yio-Wha Shau²

¹National Chiao Tung University, Taiwan; ²Industrial Technology Research Institute, Taiwan


    Ching-Ju Cheng, Shih-Yang Wu, Shih Kang, Tien-Ho Chen, Wai-Chi Fang

National Chiao Tung University, Taiwan
Session Code: C4L-A
Innovative Circuits for Medical Applications I
Moderator: Wouter Serdijn & Philipp Hafliger

C4L-A-1 A Compact, Low Input Capacitance Neural Recording Amplifier with Cin/Gain of 20fF.V/V
Kian Ann Ng, Yong Ping Xu
National University of Singapore, Singapore

C4L-A-2 A Sensor-Merged Oscillator-Based Readout Circuit for Pizeo-Resistive Sensing Applications
Yi-Lin Tsai, Po-Yun Hsiao, Li-Guang Chen, Che-Wei Huang, Hsiao-Ting Hsueh, Chih-Chan Tu, Chih-Ting Lin, Shey-Shi Lu, Tsung-Hsien Lin
National Taiwan University, Taiwan

C4L-A-3 A 0.7-V 600-nW 87-dB SNDR DT-Delta Sigma Modulator with Partly Body-Driven and Switched Op-Amps for Biopotential Signal Acquisition
Ali Fazli Yeknami, Atila Alvandpour
Linkoping University, Sweden

C4L-A-4 A 8-MHz Bandwidth Continuous-Time ΔΣ Modulator with DAC Error Sensitivity Reduction for Medical Ultrasonic Applications
Teng-Chuan Cheng, Tsung-Heng Tsai
National Chung Cheng University, Taiwan

C4L-A-5 A 0.7-V 17.4-μW 3-Lead Wireless ECG Soc
Mahmood Khayatzadeh, Xiaoyang Zhang, Jun Tan, Wen-Sin Liew, Yong Lian
National University of Singapore, Singapore
Session Code: C5P-B
Biosignal Processing II
Moderator: Mohamad Sawan

C5P-B-2  Development of Augmented Reality Body-Mark System to Support Echography .......... 348
Takashi Yoshinaga1, Daisaku Arita1, Kohji Masuda2
1Institute of Systems, Information Technologies and Nanotechnologies, Japan; 2Tokyo University of
Agriculture and Technology, Japan

C5P-B-3  A Comparison of Interpolation Techniques for RR Interval Fitting in AR Spectrum Estimation .................................................................................................................. 352
Dae-Geun Jang1, Jae-Keun Jang2, Umar Farooq2, Seung-Hun Park2, Minsoo Hahn1
1Korea Advanced Institute of Science and Technology, South Korea South; 2Kyung Hee University, South Korea

C5P-B-4  An Adaptive Real-Time Method for Fetal Heart Rate Extraction Based on Phonocardiography .................................................................................................................. 356
Kai Yang, Hanjun Jiang, Jingjing Dong, Chun Zhang, Zhihua Wang
Tsinghua University, China

C5P-B-5  Efficient Eye Blink Detection System Using RBF Classifier ........................................ 360
Sandy Rihana, Pascal Damien, Tony Moujaess
Holy Spirit University, Lebanon
C5P-C-1  Novel Time-Frequency Approach for Muscle Fatigue Detection Based on sEMG ..........364
   Fengjun Bai, Tomasz Marek Lubecki, Chee Meng Chew, Chee Leong Teo
   National University of Singapore, Singapore

C5P-C-2  Nonlinear FHR Baseline Estimation Using Empirical Mode Decomposition and
   Kohonen Neural Network .................................................................368
   Yaosheng Lu, Shouyi Wei, Xiaolei Liu
   Jinan University, China

C5P-C-3  Use of Accelerometers to Detect Motor States in a Seizure of Rats with Temporal
   Lobe Epilepsy .................................................................................372
   Yu-Lin Wang\(^1\), Sheng-Fu Liang\(^1\), Fu-Zen Shaw\(^1\), Alvin W.Y Su\(^1\), Yin-Lin Chen\(^2\), Ssu-Yen Wu\(^1\)
   \(^1\)National Cheng Kung University, Taiwan; \(^2\)National Chiao Tung University, Taiwan

C5P-C-4  A 4.88\(\mu\)W ECG Delineator Using Wavelet Transform for Mobile Healthcare
   Application .................................................................376
   Po-Yao Chang, Shu-Yu Hsu, Chen-Yi Lee
   National Chiao Tung University, Taiwan

C5P-C-5  Brunnstrom Stage Automatic Evaluation for Stroke Patients Using Extreme Learning
   Machine .................................................................................380
   Lei Yu\(^1\), Ji-Ping Wang\(^2\), Qiang Fang\(^2\), Yue Wang\(^1\)
   \(^1\)Nanjing University of Aeronautics and Astronautics, China; \(^2\)Suzhou Institute of
   Biomedical Engineering and Technology, CAS, China
Session Code: C6L-A

Lab on Chip I / Bioinspired Systems II

Moderator: Pantelis Georgiou & Ralph Etienne-Cummings

C6L-A-1  A 0.8μW 8-bit 1.5~20-Pf-Input-Range Capacitanceto-Digital Converter for Lab-on-Chip Digital Microfluidics Systems ................................................................. 384
Yanjie Xiao, Tantan Zhang, Pui-In Mak, Man-Kay Law, Rui P. Martins
University of Macau, China

Tongxi Wang, Mei Yan, Xiwei Huang, Qixiang Jia, Hao Yu, Kiat Seng Yeo
Nanyang Technological University, Singapore

C6L-A-3  Multi-Layer Planar Micro-Coils Chip as Actuators and Heaters for Biological Applications ................................................................................................................................. 392
Chen-Chia Chen¹, Shih-Hsun Hsu¹, Chen-Hsiang Sang², Chih-Chyau Yang¹,
Chien-Ming Wu¹, Chun-Ming Huang¹, Jeng-Tzong Sheu²
¹ National Chip Implementation Center, Taiwan; ² National Chiao Tung University,
Taiwan

C6L-A-4  Neuromorphic Hardware for Rapid Sparse Coding .......................................................... 396
Samuel Shapero, Paul Hasler
Georgia Institute of Technology, USA

C6L-A-5  Neuron Array with Plastic Synapses and Programmable Dendrites ............................... 400
Shubha Ramakrishnan, Richard Wunderlich, Paul Hasler
Georgia Institute of Technology, USA